

The NAO and the Sea Ice Flux, Ice Motion, and Perennial
Ice Coverage of the Arctic Ocean

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It has been shown, over an 18-year period between 1978 and 1996, that the Fram Strait ice area flux is strongly correlated with the positive phase of the North Atlantic Oscillation [Kwok and Rothrock, 1999]. The composite fields of ice motion at the extremes of the NAO reveal anomalies that are organized into coherent large-scale patterns [Kwok, 2000]. Increased Fram Strait ice flux and increased advection of sea ice from the Eastern to the Western Arctic Ocean are associated with the positive phases of NAO. We show here, with two years of data from the NSCAT and Quikscat scatterometers, the contrast in the perennial sea ice coverage of the Arctic Ocean at the beginning and end of the winters of 1996/97 and 1999/00. The 96/97 winter has an NAO index of -0.2 while the 99/00 winter has an index of 2.8. Between the two years, the coverage of the perennial ice coverage has been reduced by more than 20%. We attribute this reduction in part to the increased ice flux during the positive NAO winters of 99/00 and the intervening years. Increased melt during the summers is also evident in the decreased perennial ice coverage at the beginning of the winter of 99/00. The advection of the edge of the perennial ice cover towards the western Arctic Ocean at the end of winter can be seen. The extent of the perennial ice coverage is climatologically significant due to its thickness and its strong relation to the summer ice concentration. In addition to the new observations of perennial ice, we extend the coverage of our ice flux estimates and ice motion data set to encompass the 23 years from 1978 through 2000. Current results of the correlation between the NAO index and these data sets are discussed.

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